



**MBA Hospital, Health, Pharmaceutical and Development Management
(2023-2025)**

Second Year, Term 5 End Term Examination, February 2025

EC-249 Lean Operations Management and Six Sigma in Healthcare

Time - 3 Hours

Maximum Marks: 50 (Minimum Marks: 20)

Instructions to students:

- This question paper contains 3 printed pages.
- Don't write anything on the Question Paper except writing your Enrolment No.

Part A

(Maximum Marks: 5)

Q1. Choose the correct option for the following questions (1 mark each):

- a) Who is the father of Toyota Production System (TPS)?
 - a) Taiichi Ohno
 - b) W. Edwards Deming
 - c) Philip Crosby
 - d) Genichi Taguchi
- b) Shouldice Hospital in Canada, first example of mass production in healthcare industry is widely known for which surgery:
 - a) Cataract
 - b) Appendix
 - c) Hernia
 - d) Gallbladder
- c) Which term refers to a signaling device?
 - a) Muda
 - b) Kaizen
 - c) poka-yoke
 - d) kanban
- d) Which of the following is NOT among the 7QC tools for investigating the presence of quality problems and their causes
 - a) Decision tree
 - b) Statistical Quality Control Chart
 - c) Cause-and-effect diagram
 - d) Pareto diagram
- e) In an outpatient blood draw process, the department is open for 8 hours/day, with two breaks of 15 min. The department process 100 patients per day. The takt would be:
 - a) 4 min
 - b) 4.5 min
 - c) 6 min
 - d) 10 min

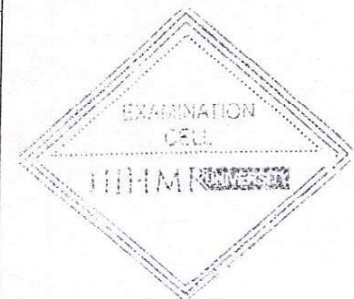
Part B**(Maximum Marks: 15)****Answer any three of the following questions (5 marks each):**

- Q2. What do understand by quality in healthcare. Explain the seven wastes of lean management.
- Q3. Explain the phases of implementing JIT including value steam mapping.
- Q4. Explain poka-yoke (mistake proofing) for lean healthcare.
- Q5. Write a short note on any one of the following:
- (i). Cause and Effect Diagram
 - (ii). Pareto Chart
 - (iii). Systematic layout planning

Part C**(Maximum Marks: 30)****Answer any three of the following questions in detail (10 marks each):**

- Q6. Explain the major tools used in DMAIC methodology for process improvement used in Lean Six Sigma.
- Q7. What are the Five S's (5S) of Lean Six Sigma in healthcare. Explain the strategies used in implementation of 5S in healthcare facility.
- Q8. Explain Standard Work in lean six-sigma. Explain the standard time and how it is determined.
- Q9. Pre- and post-examination processing of patients in an outpatient clinic involves various tasks performed by nursing staff. A time study conducted by the quality department is shown in the table below.

TIME STUDY		Observed time (in minutes)										
Activity	Performance Rating	1	2	3	4	5	6	7	8	9	10	11
Registration	1.15	3	6	4	8	4	5	4	6	4	6	4
Co-payment	0.95	7	9	11	8	12	9	6	11	9	12	10
Wait for nurse	1.00	17	15	17	12	11	17	12	19	12	20	18
Vital signs	0.96	9	8	11	12	9	8	10	12	8	12	11
Wait for exam room	1.00	12	15	12	14	21	18	11	16	9	14	18
Placement to exam room	0.98	3	5	4	6	3	5	3	6	5	4	7
Wait for physician	1.00	10	17	21	11	13	15	14	12	19	15	9
Examination	1.00	18	15	19	22	18	12	19	21	16	21	17



Test order entry	1.02	4	7	3	5	4	11	9	12	11	14	9
Referral requests	1.11	11	10	16	9	8	9	7	7	9	7	6
Follow-up appointment scheduling	1.08	3	5	3	4	3	4	4	5	3	3	5

Determine the standard time for the pre-post exam process, using the basic-moderate allowance (12%) for the job. Calculate the standard time for the exam process. Do you think the time spent in the outpatient clinic, without including the exam time, is reasonable?

- Q10. The Chief Nursing Officer (CNO) is concerned about medication errors in a hospital unit. Collection of data over a year is shown below:

Hospital unit	
Month	Medication Errors
Jan	4
Feb	6
Mar	2
Apr	5
May	3
Jun	6
Jul	3
Aug	4
Sep	5
Oct	3
Nov	7
Dec	4



Calculate LCL and UCL for c-chart, using 95.5 percent confidence (2σ) limits. Construct a control chart for the unit. Are any observations in violation of the control limits for the unit?